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Chemical and Biological Weapons in the Third World

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CHEMICAL AND BIOLOGICAL WEAPONS IN THE THIRD WORLD

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I. INTRODUCTION

As Iraqi tanks rolled over Kuwait in August 1990 and Arab and United States (U.S.) troops prepared for combat with Iraq,[1] the specter of chemical and biological warfare hovered above the desert sands. Developing countries, particularly in the Middle East, are investing heavily in the acquisition of nonconventional weapons,

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[1] Friedman, *The Iraqi Invasion*, N.Y. Times, Aug. 4, 1990, at 1, col. 4; Kifner, *Arabs Vote to Send Troops to Help Saudis*, N.Y. Times, Aug. 11, 1990, § 1, at 1, col. 6.

especially, but not exclusively, chemical weapons (cw).[2] Although the U.S.-Soviet executive agreement mutually to reduce stockpiles to 5000 agent-tons by the year 2002[3] has diminished the threat of chemical warfare substantially in the U.S.-Soviet context, this agreement in no way reduces the threat of chemical warfare in the developing world. In developing countries, for reasons described herein, cw are more likely to be used and their effects may be more deadly.

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[2] Chemical weapons are non-living substances that may be used to cause death or incapacitation in humans or animals. Biological weapons are living organisms, most commonly self-replicating microorganisms such as bacteria and viruses, deliberately disseminated to cause death or disease in humans, animals or plants. UNITED NATIONS, CHEMICAL AND BACTERIOLOGICAL (BIOLOGICAL) WEAPONS AND THE EFFECTS OF THEIR POSSIBLE USE, U.N. Rep. No. E. 69, I. 24, at 5 (1970). Unlike cw, which produce their toxic effects directly, biological agents affect other living matter by multiplying in their target host. *Id.* Toxins are either poisons produced by living organisms, or synthetically produced analogues of naturally occurring substances that cause death or incapacitation in humans, animals or plants. *See id.* at 5–6.

In the text of the Chemical Weapons Convention currently being negotiated in Geneva, "chemical weapons" applies to toxic chemicals and munitions designed for their dissemination, either together or separately. The negotiators have not yet agreed to a definition of "toxic chemicals." A proposed definition is, "chemicals . . . whose toxic properties can be utilized to cause death or temporary or permanent harm, to man or animals . . . ." United Nations Conference on Disarmament CD/952, at 22–23.

Two points are worth noting about the definition. The first is that the chemical agent itself and the means of dissemination are both defined as cw, either together or separately. *See id.* The second point of interest is that intent is an essential part of the definition: "Chemical weapons" applies to "toxic chemicals . . . except such chemicals intended for purposes not prohibited by the Convention as long as the types and quantities involved are consistent with such purposes." *Id.* at 21. "Purposes not prohibited by the Convention" means "industrial, agricultural, research, medical or other peaceful purposes, domestic law enforcement purposes; and military purposes not connected with the use of chemical weapons" (i.e., for research and development associated with chemical defense). *Id.* at 22–23.

For a discussion of the spread of nonconventional weapons in the Middle East, see generally Carus, *Chemical Weapons in the Middle East*, POLICY FOCUS, Dec. 1988; S. CARUS, THE GENIE UNLEASHED: IRAQ'S CHEMICAL AND BIOLOGICAL WEAPONS PRODUCTION (1989).

[3] *Union of Soviet Socialist Republics—United States: Agreement on Destruction and Non-Production of Chemical Weapons and on Measures to Facilitate the Multilateral Convention on Banning Chemical Weapons* 29 I.L.M. 932 (1990).

"Agent-tons" refers to the weight of the chemical agent alone, not including the weight of munitions or containers. Estimates of the size of the Soviet stockpile vary—from 50,000 agent-tons (the Soviets' own claim, with which the Central Intelligence Agency now concurs)—to greater than 700,000 tons. The Defense Intelligence Agency estimates that the Soviet stockpile contains 75,000 agent-tons; State Department and Army estimates are considerably higher, as are those of other Western governments. *See, e.g.*, Smith, *Estimate of Soviet Arms Is Cut: U.S. Revises Figure on Chemical Weapons*, Wash. Post, Nov. 9, 1989, at A7. The smallest of these figures suggests that the Soviet stockpile is approximately 60% larger than that of the U.S., which is estimated to be 30,000 to 31,000 agent-tons. *See, e.g., U.S. Chemical Weapons Production: Poisoning the Atmosphere*, 18 THE DEFENSE MONITOR 4, 7 (No. 3, 1989).

The international community has wrestled with the problem of chemical and biological weapons (cbw) throughout this century. Two international treaties have resulted: the Geneva Protocol,[4] which prohibits the use of cbw,[5] and the Biological Weapons Convention,[6] which outlaws the development, possession, and transfer of biological and toxin weapons. In spite of these treaties, the threat of chemical or biological warfare persists.

The U.S. has a number of alternatives, including both legal and military measures, to mitigate the likelihood that cbw will be used against U.S. troops or those of its allies. The most comprehensive legal option to reduce the threat of chemical warfare is to adopt the Chemical Weapons Convention currently being negotiated at the Conference on Disarmament in Geneva. This Convention would ban production, stockpiling, and transnational transfer of chemical warfare agents.[7] The U.S. Congress is considering other legal options, including legislation that would expand the list of chemical and biological substances controlled for export.[8] The Third United Nations Review Conference of the Biological Weapons Convention, to be held in 1991,[9] will provide a forum for the

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[4] The Geneva Protocol, June 17, 1925, 26 U.S.T. 571, T.I.A.S. No. 8061, 94 L.N.T.S. 65.

[5] Many countries reserve the right to retaliate with cw. *See infra* notes 61–62, and accompanying text.

[6] The Biological Weapons Convention, Apr. 10, 1972, 26 U.S.T. 583, T.I.A.S. No. 8062, 1015 U.N.T.S. 163.

[7] The Geneva Protocol, on the other hand, refers only to *use* of cw, not production or export. 26 U.S.T. 571, T.I.A.S. No. 8061, 94 L.N.T.S. 65.

> Members of the Conference on Disarmament [CD] include the 5 nuclear-weapons-States, as well as representatives of the Neutral and Non-Aligned States, Western countries, and Socialist countries. Members of the Conference on Disarmament are: Group of 21: Algeria, Argentina, Brazil, Myanmar (Burma), Cuba, Egypt, Ethiopia, India, Indonesia, Iran, Kenya, Mexico, Morocco, Nigeria, Pakistan, Peru, Sri Lanka, Sweden, Venezuela, Yugoslavia, Zaire; Group of Western countries: Australia, Belgium, Canada, Federal Republic of Germany, France, Italy, Japan, Netherlands, United Kingdom, United States; Group of Socialist countries: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Poland, Romania, Soviet Union. China is a member of the CD but does not belong to any of the three political groups.

See T. BERNAUER, THE PROJECTED CHEMICAL WEAPONS CONVENTION: A GUIDE TO THE NEGOTIATIONS 5 n.4 (1990).

[8] Two competing bills before the U.S. Congress would augment the Export Administration Act of 1979, 50 U.S.C. app. § 2405 (1982), to control export of precursors to cbw. The Senate bill, S. 195, passed unanimously in May 1990. S. 195, 101st Cong., 1st Sess. (1989). The House passed a similar bill, H.R. 3033, in November 1989. H.R. 3033, 101st Cong., 1st Sess. (1989).

[9] Second Review Conference of the Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons

parties to the Convention to increase confidence in the treaty.[10] This Conference may strengthen declarations of permitted activities to which parties agreed at the Second Review Conference of the Biological Weapons Convention in 1986.[11] It may also begin the process that would lead to a verification protocol to the Convention.

This article presents the historical events that led to the cbw arms control agreements adopted in the past and examines the shortcomings of the existing arms control regime. In particular, it discusses the proliferation of cbw in the developing world, Iraq's use of chemical agents in the Iran-Iraq War, and whether cw will be used again in the Middle East. Finally, it proposes methods for decreasing the likelihood that cbw will be used in future wars. These methods include the adoption of a global and verifiable ban on cw and toxins, a verification protocol for the Biological Weapons Convention and the imposition of stricter export controls on precursors to cbw. Because no treaty yet exists governing the possession of cw and because it is more likely that cw will be used in future conflicts than biological weapons (bw), a greater emphasis is put on the control of cw.

II. CBW Arms Control Treaties

International efforts to prohibit the use and possession of chemical, biological and toxin weapons have a long history. Prior to the advent of modern science, these weapons were not distinguished from one another. They were all grouped under the category of poisons.[12]

A. *The Hague Convention*

At the Hague Convention of 1899, nations agreed "to abstain from the use of projectiles the object of which is the diffusion of asphyxiating or deleterious gases."[13] The U.S. declined to sign this treaty, because, in Secretary of State Hay's words:

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and on Their Destruction, Final Document, art. XII (reprinted in Stockholm International Peace Research Institute (SIPRI) Chemical and Biological Warfare Studies, No. 10: Strengthening the Biological Weapons Convention by Confidence-Building Measures Annexe 2 (E. Geissler ed. 1990)) [hereinafter Second Rev. Conf.].

[10] 26 U.S.T. 583, T.I.A.S. No. 8062, 1015 U.N.T.S. 163, art. XII.

[11] Second Rev. Conf., *supra* note 9, at art. V.

[12] *See generally* Moon, Laws of War in Relation to the Use of Poisoned Weapons (unpublished manuscript on file at the Boston College Third World Law Journal office).

[13] The Hague Convention of 1899, 26 Martens Nouveau Recueil (ser. 2) 998, 187 C.T.S. 459 (1899).

> The expediency of restraining the inventive genius of our people in the direction of devising means of defense is by no means clear, and considering the temptations to which men and nations may be exposed in a time of conflict, it is doubtful if an international agreement to this end would prove effective . . . .[14]

Secretary Hay's suspicions about the effectiveness of the Hague agreement were prescient. During World War I, Germany initiated the use of poison gas by dispersing chlorine clouds over the Allied defenses at Ypres, Belgium, in the spring of 1915, not from the prohibited projectiles, but from cylinders. Later in the War, both alliances employed gas projectiles.[15]

B. *The Geneva Protocol*

Following the extensive use of cw in World War I, the international community sought to prevent the use of such weapons in future conflicts. In May 1925, under the auspices of the League of Nations, the Conference for the Supervision of the International Trade in Arms and Ammunition and in Implements of War considered provisions prohibiting international trade in poisonous or asphyxiating gases and materials used for bacteriological warfare.[16] Poland recommended that any proposal to ban trade in cw also include materials for bacteriological warfare.[17]

Prohibiting trade in poisonous chemicals and bacteriological materials without first rejecting their manufacture or use proved to be contentious. Merely banning the export of these weapons would not halt their manufacture in countries already capable of so doing. Countries that did not possess the means to manufacture chemical or bacteriological arms would thus be at a distinct disadvantage. The ensuing debate about the merits of a treaty that asymmetrically

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[14] *Cited in* Col. A. Waitt GAS WARFARE 12 (1942) (Chemical Warfare Service, U.S. Army).

[15] The first strict violations of the Hague Convention were the German use of T-shells, in January 1915, against the Russians, and the French use of tear grenades against the Germans at about the same time. Because neither weapon produced any noticeable tactical advantage (it is not even clear whether the victims noticed the attacks), neither side protested. A. PRENTISS, CHEMICALS IN WAR 689 (1937). "After the cloud-gas attack of April 22, 1915, however, Germany was generally considered by the Allies to have violated the spirit if not the letter of the Hague Convention, and from that date legal restraints on any variety of gas warfare were ignored." *Id.* Livens projectors (a type of artillery designed to disseminate cw), grenades, artillery shells and mortars were all used.

[16] 4 STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE: THE PROBLEM OF CHEMICAL AND BIOLOGICAL WARFARE 59 (1971) [hereinafter 4 SIPRI].

[17] *Second Meeting of the General Committee of the Conference*, League of Nations (1925) (*cited in* 4 SIPRI, *supra* note 16, at 161).

affected those countries that did not possess cw, with almost no impact on those that did, was strikingly similar to the negotiations on the nuclear non-proliferation treaty,[18] as well as to the discussion about controlling the export of precursors to cw going on today.

Ultimately, the Conference drafted and adopted the "Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases and of Bacteriological Methods of Warfare."[19] Commonly known as the Geneva Protocol, the agreement states that "the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilised world . . . ."[20] The Protocol goes on to establish that the prohibition of the use of cw in war "shall be universally accepted as a part of International Law."[21] The Protocol extends the prohibition "to the use of bacteriological methods of warfare."[22] The inclusion of the prohibition as part of international law is significant in that international law would bind even those states that are not parties to the treaty.[23]

The negotiations that led to the signing of the Geneva Protocol were only the beginning of the U.S. association with the Protocol. The U.S. was an active participant in the negotiations. The U.S. Senate, however, failed to ratify the treaty for fifty years, because a powerful combination of business and military interests—the U.S. chemical industry and the U.S. Army Chemical Warfare Service—successfully lobbied the Senate in the 1920's to prevent its ratification. The U.S. eventually ratified the Protocol in 1975, along with the Biological Weapons Convention.[24]

During World War II, the major belligerents did not use cw against each other.[25] During the confrontations in World War II, however, Italy and Japan both used cw against an unprotected foe in the Third World—Italy against Ethiopia and Japan against China.[26] Following the war, the international community once again discussed cbw disarmament through the forum of the United Na-

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[18] See 4 SIPRI, *supra* note 16, at 61–64.

[19] The Geneva Protocol, June 17, 1925, 26 U.S.T. 571, T.I.A.S. No. 8061, 94 L.N.T.S. 65.

[20] 26 U.S.T. at 575, T.I.A.S. No. 8061, 94 L.N.T.S. at 67.

[21] *Id.*

[22] *Id.*

[23] N. SIMS, THE DIPLOMACY OF BIOLOGICAL DISARMAMENT: VICISSITUDES OF A TREATY IN FORCE, 1975–85 40 (1988).

[24] *See supra* notes 4–6 and accompanying text.

[25] A. ROBERTS & R. GUELFF, DOCUMENTS ON THE LAWS OF WAR 138 (2d ed. 1989).

[26] *Id.*

tions. United Nations General Assembly resolutions in January and December 1946 called for disarmament of atomic and other weapons of mass destruction.[27] In 1948, the United Nations Commission for Conventional Armaments included cbw in its definition of "weapons of mass destruction."[28]

C. *The Biological and Toxin Weapons Convention*

Until 1968, international negotiations of controls on bw were linked to those on the control of cw. During that year, in the Eighteen Nation Disarmament Committee of the United Nations (ENDC), a member of the British Delegation suggested that the committee consider an international agreement to ban the possession of bw separate from a ban on cw.[29] The British suggestion may have had practical as well as political motivations. For several years, beginning in 1964, Cambodia and the Soviet Union had accused the U.S. of violating the Geneva Protocol in the war in Vietnam.[30] The charges concerned the U.S. use of defoliants and riot control agents.[31] The U.S. argued that the Protocol did not prohibit its use of "non-toxic" riot control agents and defoliants.[32] Knowing the gravity of the issues at stake in Indo-China, the British representative undoubtedly saw the severing of bw from cw as a way to make progress in the disarmament arena while the chemical controversy was debated elsewhere. The United Kingdom followed up its recommendation by submitting a working paper on microbiological warfare in August of 1968. Following discussions of the paper in the ENDC, the United Kingdom submitted a draft convention on bw at the Conference of the Committee on Disarmament in 1969.[33]

Meanwhile, newly-elected U.S. President Richard Nixon ordered the National Security Council to conduct an extensive review of U.S. policy on cbw. Although details of the review remain classified, Nixon took an unprecedented action on November 25, 1969 when he announced the following policy on bw:

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[27] U.N. G.A. Res. 1 (I) (1946) and U.N. G.A. Res. 41 (I) (1946).

[28] *See* 4 SIPRI, *supra* note 16, at 194–95.

[29] U.S. ARMS CONTROL AND DISARMAMENT AGENCY, DOCUMENTS ON DISARMAMENT 569–71 (1968).

[30] 4 SIPRI, *supra* note 16, at 234–37.

[31] *Id.*

[32] *Id.*

[33] U.S. ARMS CONTROL AND DISARMAMENT AGENCY, DOCUMENTS ON DISARMAMENT 324–26 (1969).

> —The United States shall renounce the use of lethal biological agents and weapons, and all other methods of biological warfare.
> —The United States will confine its biological research to defensive measures such as immunization and safety measures.
> —The Department of Defense has been asked to make recommendations as to the disposal of existing stocks of bacteriological weapons.[34]

Only by renouncing the use and possession of these weapons could the U.S. have any hope of sincerely convincing the rest of the international community that the weapons were a military albatross.[35] Through this policy, the U.S. unilaterally renounced the use and relinquished the possession of bw, presumably for all time.[36]

The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, commonly known as the Bio-

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[34] Statement on Chemical and Biological Defense Policies and Programs, 31 PUB. PAPERS OF THE PRESIDENTS OF THE UNITED STATES: RICHARD NIXON 1969 968 (1971).

[35] President Nixon had several policy options. He could have renounced first use of bw and cw only. He could have renounced first use and suspension of the production and/or modernization of bw stockpiles, while retaining possession of a quantity of bw as a deterrent or retaliatory capacity, or even as a bargaining chip to be given up in later arms negotiations. He could have destroyed existing stocks and suspended production, while leaving the future production of bw an open question should their military utility improve. He chose to renounce any use of bw, destroy existing stocks and convert existing production facilities to peaceful purposes. One of the primary reasons the Nixon Administration renounced bw was their limited military utility. For a discussion of factors bearing on the development of President Nixon's policy, see Meselson, *Behind the Nixon Policy for Chemical and Biological Warfare*, BULL. OF THE ATOMIC SCIENTISTS, Jan. 1970, at 23–24. Limited military utility, however, is not a sufficient explanation for this action. If military utility was the only force driving the decision, any one of the less radical policy alternatives could have been chosen. It was unnecessary to renounce the possession of bw for all time. The military utility of bw, after all, could change.

International criticism of the U.S. use of non-lethal chemicals in Vietnam may have been another factor behind President Nixon's policy. *See* Harris, *The Biological and Toxin Weapons Convention*, in SUPERPOWER ARMS CONTROL 193 (1987). Yet, this explanation does not help to explain why the Nixon Administration's policies treated cw and bw differently. Nor does this explanation satisfactorily account for the bw policy.

One (perhaps the only) plausible explanation for President Nixon's initiative is that he concluded that the U.S. is better off without bw than with them. As long as the U.S. chose to possess bw, it conferred a legitimacy to the possession of these weapons. A U.S. bw stockpile, moreover, would have contributed to the perception that the possession of such weapons was desirable, which in turn might contribute to the long-term proliferation of bw. *See id.* at 203. Other nations would reason that the U.S. chose to possess bw because the weapons held some value—as a deterrent, or for retaliatory, battlefield or covert use.

[36] *See* CONGRESSIONAL RESEARCH SERVICE, LIBRARY OF CONGRESS, prepared for House of Representatives, Committee of Foreign Affairs, 98th CONG., 2D SESS., BINARY WEAPONS: IMPLICATIONS OF THE U.S. CHEMICAL STOCKPILE MODERNIZATION FOR CHEMICAL WEAPONS 1 (1984) [hereinafter BINARY WEAPONS].

logical Weapons Convention, was concluded in 1972.[37] It prohibits the development, production, stockpiling, transfer and acquisition of biological and toxin weapons.[38] The Biological Weapons Convention goes beyond the Geneva Protocol in order "to exclude completely the possibility of bacteriological (biological) agents and toxins being used as weapons . . . ."[39] It is the only treaty in existence that outlaws an entire category of weapons.[40] Furthermore, parties to the treaty agreed to destroy existing stocks of weapons, making it a true disarmament treaty. The Biological Weapons Convention, however, does not contain any significant procedures to verify compliance with its provisions.

D. *Ratification of the Geneva Protocol and the Biological Weapons Convention*

Although President Nixon submitted both the Geneva Protocol and the Biological Weapons Convention to the Senate for confirmation shortly after signing the Biological Weapons Convention in 1972, the two treaties were not ratified until 1975.[41] The major reasons that ratification was delayed were to discuss the scope of the Geneva Protocol and to determine whether non-lethal chemicals, used by the U.S. in the war in Vietnam, were covered under its provisions.[42]

A secondary concern existed about whether the Geneva Protocol would prohibit the use of tear gas and other riot control agents in domestic police actions.[43] The Protocol clearly did not affect the use of chemicals in domestic police actions in that the treaty only prohibited their "use in war."[44] The broad interpretation of the Protocol[45] was that it outlawed the use of both lethal and non-lethal chemicals in its language "asphyxiating, poisonous *or other gases*."[46]

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[37] 26 U.S.T. 583, T.I.A.S. No. 8062, 1015 U.N.T.S. 163.

[38] *Id.*

[39] 26 U.S.T. at 586, T.I.A.S. No. 8062, 1015 U.N.T.S. at 166.

[40] The Intermediate-Range Nuclear Forces (INF) treaty outlawed an entire category of delivery vehicles, but it did not outlaw the weapons *per se*. 27 I.L.M. 84 (1988).

[41] *See supra* notes 4–6 and accompanying text.

[42] *See Prohibition of Chemical and Biological Weapons: Hearing Before the Comm. on Foreign Relations*, 93d Cong., 2d Sess. 26–29 (1974) [hereinafter *Hearing*].

[43] *Id.* at 26–28.

[44] 26 U.S.T. 571, T.I.A.S. No. 8061, 94 L.N.T.S. 65.

[45] For a discussion of the different interpretations of the Protocol, see 4 SIPRI, *supra* note 16, at 273, 283–86.

[46] *Id.* (emphasis added).

A narrower interpretation,[47] which the Ford administration supported at the time of the hearings, was based on the negotiating history of the Geneva Protocol and the earlier treaties dealing with CW.[48]

There was very little testimony during the ratification hearings concerning the Biological Weapons Convention. Dr. Fred Iklé, then director of the Arms Control and Disarmament Agency, testified that ratification of the treaty was in the interest of the U.S. in spite of the weak verification provisions.[49] He stated that the limited military utility and moral repugnance of the weapons contributed to his position.[50] He also argued that compliance with the treaty would discourage proliferation of BW.[51] There were no objections to the Biological Weapons Convention's ratification in the Defense Department, in the Central Intelligence Agency (CIA) or in any other branch of government. The Senate ratified it unanimously on December 16, 1974, and the treaty entered into force the following March.[52]

E. *The Review Conferences of the Biological Weapons Convention*

In March 1980, five years after the implementation of the Biological Weapons Convention, the First Conference to review the treaty's operation was held in Geneva, Switzerland.[53] Two noteworthy events marked this First Review Conference. First, the Swedish delegation led an unsuccessful effort to add verification provisions to the treaty by amending Articles V and VI of the Convention.[54] Second, because of an anthrax outbreak in the Soviet city of Sverdlovsk, the U.S. State Department declared its suspicion that the Soviets were not in compliance with the Biological Weapons Convention.[55]

As Americans had long suspected a facility in Sverdlovsk to be a biological warfare laboratory, intelligence analysts in the West

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[47] *See* 4 SIPRI, *supra* note 16, at 273, 283–86.

[48] *Hearing*, *supra* note 42.

[49] *Id.* at 15–16.

[50] *Id.* at 15.

[51] *Id.* at 15–16.

[52] 26 U.S.T. 583, T.I.A.S. No. 8062, 1015 U.N.T.S. 163.

[53] For a detailed account of the preparations for and workings of the First Review Conference, see N. SIMS, *supra* note 23, at 93–193.

[54] *Id.* at 168–93.

[55] *Id.* at 155–59.

began to wonder if a leak or explosion at the facility caused the outbreak, even though anthrax is endemic to Sverdlovsk. In the midst of the Review Conference, these suspicions of Soviet violations of the Biological Weapons Convention were aired publicly.[56] Whether the events at Sverdlovsk constituted a violation of the Biological Weapons Convention has never been officially resolved. This unresolved dispute revealed the verification weaknesses of the Convention.[57]

In contrast to the First Review, no attempt was made to amend the Convention at the Second Review Conference held in September 1986. Nevertheless, the parties to the treaty agreed to a number of measures at the Second Review Conference, embodied in the Final Declaration, that serve the purposes of verification.[58] Article IX of the Biological Weapons Convention binds the Parties of that Convention to continue negotiations towards a Chemical Weapons Convention that would outlaw not only the use of chemical agents in war (prohibited under the existing arms control regime by the Geneva Protocol),[59] but also their production, stockpiling, or transfer to other parties. A Chemical Weapons Convention, however, is still not a reality nearly twenty years after the signing of the Biological Weapons Convention.

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[56] *See id.* at 226–49; *see also* Wade, *Death at Sverdlovsk: A Critical Diagnosis*, SCIENCE, Sept. 26, 1980, at 1501. For a detailed study of the compliance issues surrounding the occurrence at Sverdlovsk, see Harris, *Sverdlovsk and Yellow Rain: Two Cases of Soviet Noncompliance?*, INTERNATIONAL SECURITY, Spring 1987, at 41. For more recent developments in the controversy, see Meselson, *The Biological Weapons Convention and the Sverdlovsk Anthrax Outbreak of 1979*, J. FED'N AM. SCIENTISTS, Sept. 1988, at 1.

[57] Robinson, *East-West Fencing at Geneva*, NATURE, Apr. 3, 1980, at 393.

[58] The delegates to the Conference recognized the deficiencies of Article V's consultation and cooperation process in resolving compliance questions. This recognition led them to adopt a provision that any party may call a consultative meeting. *See* Second Rev. Conf., *supra* note 9, at art. V. The delegates also agreed to an exchange of information on biological research, which is permitted under the treaty, and other activities that the treaty allows for "prophylactic, protective or other peaceful purposes." *Id.* Countries agreed to exchange information on:

> [the] name, location, scope and general description of activities, on research centres and laboratories that meet very high national or international safety standards established for handling, for permitted purposes, biological materials that pose a high individual or community risk, or specialize in permitted biological activities directly related to the Convention.

Id. Finally, the parties agreed to exchange information on the outbreak of diseases that might raise suspicions regarding compliance with the Biological Weapons Convention. *Id.*

[59] Thirty-five countries adopted the Geneva Protocol (26 U.S.T. 571, T.I.A.S. No. 8061, 94 L.N.T.S. 65) with reservations, restricting the ban to first use of CW. Full texts of the reservations are contained in D. SCHINDLER & J. TOMAN, THE LAWS OF ARMED CONFLICTS, (3d ed. 1988).

III. Shortcomings of the Existing Arms Control Regime

Shortcomings of the existing legal order governing cbw have become increasingly and painfully apparent. No international law prohibited Germany and other nations from assisting Egypt, Iran, Iraq, Libya and Syria with cw production.[60] The Geneva Protocol addresses only *use* of cw; it does not address production, stockpiling or transfer of chemical weapons or technologies. Moreover, the Geneva Protocol provides neither for verification of compliance nor for sanctions in the case of abrogation. Many nations reserved the right to retaliate with weapons prohibited by the Protocol if another country, whether a signatory to the Protocol or not, uses the weapons first.[61] These reservations dilute the force of the treaty. The Netherlands and the U.S., however, restrict their reservations to cw only. Both countries bind themselves not to use bw under any circumstances, even if bw are used against them.[62] Iraq's use of cw against Iranian troops and against Iraqi Kurds confirmed the need to strengthen international law to ban all use of cbw in war and to prohibit transfer of cbw technology.[63]

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[60] Gordon, *C.I.A. Sees a Developing World With Developed Arms*, N.Y. Times, Feb. 10, 1989, at A3, col. 5; *see* Thatcher & Aeppel, *The Trail to Samarra: Poison on the Wind: The New Threat of Chemical and Biological Weapons*, Christian Science Monitor, Dec. 13, 1988, at B1, col. 3 (few legal restrictions exist on export of equipment useful for making cw).

[61] Iraq signed the Geneva Protocol with the following reservation:

> On condition that the Iraq Government shall be bound by the provisions of the Protocol only towards those States which have both signed and ratified it or have acceded thereto, and that they shall not be bound by the Protocol towards any State at enmity with them whose armed forces or the forces of whose allies, do not respect the disposition of the Protocol.

U.N. Department for Disarmament Affairs, Status of Multilateral Arms Regulations and Disarmament Agreements 9 n.17 (3d ed. 1987). Iraq defended its use of cw in the Iran-Iraq War by accusing Iran of having used cw first. "Iraq Foreign Minister Tariq Aziz . . . confirms once again his country's use of cw against Iran 'from time to time,' but states that Iran had used it first, 'from the very beginning' of the war." Chemical Weapons Convention Bulletin, Autumn 1988, at 6.

[62] The Netherlands made the distinction between cw and bw in 1930; the U.S. did so when it ratified the Protocol in 1975. D. Shindler & J. Toman, *supra* note 59, at 120-21. The Netherlands' reservation reads: "Subject to the reservation that this Protocol as regards the use in war of asphyxiating, poisonous or other gases and of all analogous liquids, materials or devices, shall cease *ipso facto* to be binding on the Royal Government of the Netherlands in regard to any enemy state whose armed forces or whose allies fail to respect the prohibitions laid down in this Protocol." *Id.* at 124. The U.S. reservation is similar: "The Protocol shall cease to be binding on the government of the United States with respect to the use in war of asphyxiating, poisonous or other gases, and all analogous liquids, materials, or devices, in regard to an enemy state if such state or any of its allies fails to respect the prohibitions laid down in the Protocol." *Id.* at 126.

[63] *See Winds of Death: Iraq's Use of Poison Gas Against Its Kurdish Population* (a Report of the Physicians for Human Rights), Feb. 1989, at 4, 11, 13 & Appendix D.

Finally, the weak provisions in the Biological Weapons Convention to resolve issues of noncompliance do not allow for the investigation of suspicious activities that fall short of use. The Secretary-General of the United Nations has the authority to investigate the possible use of cbw under United Nations General Assembly Resolutions.[64] There is, however, no authority to investigate violations of the Biological Weapons Convention such as development, possession or transfer of bw that do not involve use. The absence of a verification regime in the Biological Weapons Convention, moreover, makes it difficult for parties to the treaty to be confident that other nations are complying with its provisions.

IV. CBW IN THE THIRD WORLD

Every confirmed use of cw since World War I has occurred in the developing world. These include the use of cw by Italy in Ethiopia during 1935-36, by Japan in China during 1937-45, by Egypt in Yemen during 1963-67, by Iraq in Iran during 1983-88 and by Iraq in Kurdistan during 1987-88.[65] There have, moreover, been unproven allegations of the use of biological and toxin weapons in the Third World. North Korea and China accused the U.S. of using "germ warfare" during the Korean War.[66] More recently, the U.S. accused Vietnam and the Soviet Union of using toxin weapons, the notorious "Yellow Rain," against the Cambodians and Laotians in Southeast Asia.[67]

A. *CBW Proliferation in the Third World Nations*

U.S. government statements about the number of states in the developing world that possess cw are ambiguous, and even contra-

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[64] *See* U.N. G.A. Res. 37/98 D(1982), 39/65 E(1984) & 42/37 C(1987).

[65] R. MCELROY, BRIEFING BOOK ON CHEMICAL WEAPONS 5–6 (1989); A. ROBERTS & R. GUELFF, *supra* note 25 at 138; *Winds of Death: Iraq's Use of Poison Gas Against Its Kurdish Population*, *supra* note 63, at 37–38. Seven United Nations missions documented evidence of the Iraqi use of cw in the Iran-Iraq War. United Nations reports include U.N. Doc. S/15834, June 2, 1983; U.N. Doc. S/16433, Mar. 26, 1984; U.N. Doc. S/17911, Mar. 12, 1986; U.N. Doc. S/18852, May 18, 1987; U.N. Doc. S/19823, Apr. 25, 1988; U.N. Doc. S/20063, July 25, 1988, and U.N. Doc. S/20134, Aug. 19, 1988.

[66] 1 SIPRI: THE PROBLEM OF CHEMICAL AND BIOLOGICAL WEAPONS, I: THE RISE OF CB WEAPONS 224–25 (1971).

[67] *See* UNITED STATES DEPARTMENT OF STATE, SPECIAL REP. 98, CHEMICAL WARFARE IN SOUTHEAST ASIA AND AFGHANISTAN, (Report to the Congress from Secretary of State Alexander M. Haig, Jr., Mar. 22, 1982); UNITED STATES DEPARTMENT OF STATE, SPECIAL REP. 104, CHEMICAL WARFARE IN SOUTHEAST ASIA AND AFGHANISTAN: AN UPDATE, (Report from Secretary of State George P. Shultz, Nov. 1982).

dictory. Iraq has admitted to possessing cw,[68] and United Nations teams confirmed Iraq's use of cw in the Iran-Iraq War on several occasions.[69] According to Elisa Harris, Senior Analyst at the Brookings Institution, eleven additional developing countries are "probable" cw states.[70] These countries do not admit to possessing cw, but U.S. governmental officials have issued statements on the record that these nations are developing, producing or stockpiling cw.[71] These "probable" cw-possessing states include: Burma, China, Egypt, Ethiopia, Iran, Israel, Libya, North Korea, Syria, Taiwan, and Vietnam.[72] Harris categorizes an additional eleven states as "possible" possessors of cw—that is, states that have been reported by Western government officials, usually off the record, as seeking to acquire chemical agents, or as suspected of possessing cw.[73] Most unclassified information about the spread of cbw in the developing world pertains to the Middle East.

The spread of bw into the Third World also may be growing. In May 1988, a U.S. Defense Department witness testifying before Congress stated that between 1972 and 1988 the number of countries "having or suspected of having" offensive bw programs rose from four to ten.[74] Some of those countries were said to be in the Middle East,[75] such as Iraq, which is allegedly doing research on bw.[76] More recently, Admiral C.A.H. Trost of the U.S. Navy testified that the number of countries suspected of developing bw had risen to fifteen.[77] While the U.S. may "suspect" a country of having an offensive bw program with very little evidence, at a minimum there exists the perception that the proliferation of bw is increasing.

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[68] *See* CHEMICAL WEAPONS CONVENTION BULLETIN, Autumn 1988, at 6.

[69] *See supra* note 65.

[70] *See* Harris, *Chemical Weapons Proliferation*, in APSEN STRATEGY GROUP, NEW THREATS: RESPONDING TO THE PROLIFERATION OF NUCLEAR, CHEMICAL, AND DELIVERY CAPABILITIES IN THE THIRD WORLD 67–87 (1990) (excellent discussion of proliferation).

[71] *Id.*

[72] *Id.*

[73] *Id.* at 71. Harris lists the following States as possible possessors of cw: Angola, Argentina, Cuba, India, Indonesia, Laos, Pakistan, Somalia, South Africa, South Korea, and Thailand. An additional eleven states Harris claims are "doubtful" possessors of cw—states that have been accused of possessing cw by adversaries, including: Afghanistan, Chad, Chile, El Salvador, Guatemala, Jordan, Mozambique, Nicaragua, Peru, Philippines and Sudan. *Id.*

[74] Cushman, *U.S. Cites Increase in Biological Arms*, N.Y. Times, May 4, 1988, at A9, col. 1.

[75] *Id.*

[76] Engelberg, *Iraq Said to Study Biological Arms*, N.Y. Times, Jan. 18, 1989, at A7, col. 1.

[77] Statement by Admiral C.A.H. Trost, U.S. Navy, Chief of Naval Operations, before the House Armed Services Committee on the Posture and Fiscal Year 1991 Budget of the United States Navy 5, Feb. 20, 1990.

B. *Will Chemical Weapons Be Used Again in the Middle East?*

1. Possible Use by Nations

There is not a single instance in history in which an aggressor initiated the use of cw into a conflict against a victim who was well protected or was capable of retaliating in kind.[78] Although the capability to respond in kind appears to have strong deterrent effects, it is not clear how closely matched the opposing forces must be. Chemical weapons may be an attractive option for non-nuclear powers because of asymmetries in defense and in-kind retaliatory capabilities and because of the cost-effectiveness of chemical agents used against unprotected troops or civilian targets.[79]

The size of chemical stockpiles, the sophistication of chemical-defense training, the technical characteristics of chemical protective gear and the availability of collective protection vary greatly among Middle East nations. These factors are sufficiently disparate to give several of these nations reason to believe that they might be able to use chemical agents to their advantage.[80] The mounting tensions in

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[78] This is true for the battle of Ypres in World War I; the Japanese chemical attacks against the Chinese and the Italian use of gas against the Abyssians in World War II; the Egyptian use of chemical agents in Yemen in 1967; and finally, the Iraqi use of cw against the Iranian pasdaran and against the Kurds in the 1980's Iran-Iraq War. Although the Allied soldiers, during World War I, learned fairly quickly that a handkerchief soaked with urine was better protection against chlorine than nothing at all, this does not constitute "well protected." As World War I continued, the Allies acquired gas masks and procured the means with which to retaliate in kind.

[79] It is against insurgents that chemical agents may prove themselves most useful. Iraq's use of mustard (and possibly Tabun) against the Kurds, and the Soviet use of chloropicrin in Georgia may be harbingers of future events.

[80] Six Middle East countries are believed to possess cw or have cw production capacity. The best equipped appear to be Israel (especially in defense); Iraq (soon to be capable of indigenous manufacture); and Syria (rumored to possess cw warheads for missiles). A detailed discussion of the potential for chemical warfare in the Middle East is contained in J. Stern, Chemical Weapons Threat and the Middle East: United States Policy Alternatives, (Center for Science and International Affairs, Harvard University, 1989). Middle East cw capabilities are as follows:

—Egypt: Egypt produced and used mustard and other lethal gases in its war with Yemen, and completed research and designs for production of nerve agents before 1973. Cordesman, The Middle East and Weapons of Mass Destruction 4 (Oct. 25, 1988) (Office of Senator John McCain) (copy on file at the Boston College Third World Law Journal office); Carus, *Chemical Weapons in the Middle East,* POLICY FOCUS, Dec. 1988, 1, 2–3 [hereinafter Carus, *Chemical Weapons*].

—Iran: Reports in the press indicate that Iran has a stockpile of mustard and that Iran's nerve agent production capacity is nearing completion. Detailed listing of press reports in Stern, *supra*, at 48–53. *See also* Carus, *supra*, at 3.

—Iraq: Iraq has a large manufacturing capacity for nerve agents, mustard and cyanide. It

the region, the burgeoning cw industries and the ever-escalating influx of conventional weapons do not bode well.[81]

Several lessons of the Iran-Iraq War inform our discussion. First, Iraq and Iran appear to have been sufficiently impressed by the results of chemical warfare that both nations are pursuing the manufacture of these weapons with enhanced vigor, despite the cease-fire and international efforts to keep precursors to these weapons out of the Gulf.[82] Second, foreign policy objectives stifled much of the West's response to Iraq's repeated abrogation of the Protocol.[83] Any nation considering use of cw would probably take

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made extensive use of chemical agents in the Iran-Iraq War. Iraq is believed to have the largest stockpile of chemical agents in the region, and may soon acquire an indigenous manufacturing capability for nerve agents. S. CARUS, THE GENIE UNLEASHED: IRAQ'S CHEMICAL AND BIOLOGICAL WEAPONS PRODUCTION 7–11, 19, 22, 26–28 (1989).

—Israel: Anthony Cordesman states that Israel has a plant for manufacturing nerve agents and has done significant research into offensive and defensive cw. Cordesman, *supra*, at 5. Israel excels at chemical defense. Fairhall, *Israeli Defences Against Arab Gas Attacks*, Manchester Guardian Weekly, Mar.12, 1989, at 11; Chartrand, *Israelis Devise Plastic Suit as Shield Against Iraqi Gas*, N.Y. Times, Aug. 28, 1990, at A14, col. 1; Brinkley, *Israel Will Provide Gas Masks and Gear for All Its Residents*, N.Y. Times, Oct. 2, 1990, at A13, col. 6.

—Libya: William Webster, the Director of the CIA, called Libya's cw factory "maybe the single largest chemical warfare agent plant in the Third World." Norman, *CIA Details Chemical Weapons Spread*, SCIENCE, Feb. 17, 1988, at 888. U.S. government officials indicated that a fire on March 14, 1990, may have extensively damaged the plant's capacity for production. Later reports, however, indicated that the fire may have been a hoax. Gordon, *U.S. Says Evidence Points to Hoax in Fire at Libyan Chemical Plant*, N.Y. Times, June 19, 1990, at 8, col. 3. Libya may have used chemical agents or highly toxic CS (an irritant) in its war with Chad. Cordesman, *supra*, at 4.

—Syria: According to William Webster, Syria began producing cw in the mid-1980's. Norman, *supra*, at 888. Anthony Cordesman states that Syria has a facility for producing nerve agent. Cordesman, *supra*, at 6. Israeli intelligence officials claim to have hard evidence that Syria has attached chemical warheads to Scud missiles. Fairhall, *supra*.

[81] *See, e.g.*, R. Shuey, W. Lenhart, R. Snyder, W. Donnely, J. Mielke & J. Motell, Missile Proliferation: Survey of Emerging Missile Forces, Oct. 3, 1988 (Congressional Research Report for Congress) [hereinafter R. Shuey]; Carus, *NATO, Israel and the Tactical Missile Challenge*, POLICY FOCUS, May 1987 [hereinafter Carus, *NATO*]; *see also* McNaugher, *Ballistic Missiles and Chemical Weapons: The Legacy of the Iran-Iraq War*, INT'L SECURITY, Fall 1990, at 5.

[82] "Like Iraq, Iran is continuing to expand its chemical warfare program even after the cease fire . . . ." Norman, *supra* note 80, at 888 (quoting William Webster, Director of the Central Intelligence Agency). Were cw to have had negligible impact in this war, as some analysts claim, such efforts would be less likely. While prestige and deterrence might also be arguments for the acquisition of chemical agents, both of these factors depend on the perception that the weapons are useful.

[83] Iran's nearly continuous pleas for stronger condemnation of Iraq by the U.S. and the other members of the Security Council went essentially unheard until the summer of 1988, when Iraq used cw against its own Kurdish population. *See* Statement of His Excellency Dr. Ali Akbar Velayati, Minister of Foreign Affairs of the Islamic Republic of Iran to the Conference on Disarmament 4 (July 28, 1987) (copy on file at the Boston College Third World Law Journal office).

this reticence of the international community into account in deciding whether to escalate to the use of cw. Nations' reluctance to respond to the use of weapons banned by international law must also be factored into any decision to adopt the more comprehensive treaty currently under negotiation. This treaty may include sanctions against use, possibly even military sanctions.[84]

Finally, cw were clearly most effective when used against unprotected civilians. Prior to April 8, 1987, when most of the Iraqi attacks were against military targets, 262 of the 27,571 victims of chemical warfare died.[85] When the Iraqis began to attack population centers such as Sardasht and Halabja, thousands of civilians were killed.[86]

Chemical weapons might be particularly well-suited for use in the Middle East for several reasons. Because the missiles stockpiled by the Arab states are relatively inaccurate,[87] a weapon with a large "footprint" (one that affects a large area) is desirable. Chemical agents offer just this possibility. The use of chemical agents greatly expands the area of destruction of artillery and short range missiles.[88] The most efficient use of chemical-agent-tipped missiles might be against population centers, against which pinpoint accuracy is not required to yield large-scale destruction. While a comprehensive civil defense program would be desirable, such a program is clearly not feasible: the costs would be prohibitive for most

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[84] The Geneva Protocol does not spell out terms of international retribution in the case of abrogation. The current discussions in Geneva are still inconclusive with respect to the Treaty regime's response to abrogations, particularly in the case of use; possibilities include aid to victims, including military aid. *See* United Nations Conference on Disarmament CD/952, app. II.

Another possibility, suggested by Raymond Cohen and Robin Ranger of the U.S. Institute for Peace, would be to maintain an international stockpile of cw with which to supply victims of a chemical attack in order to retaliate in kind. This plan, though thought-provoking, would hardly sharpen the teeth of international law. R. COHEN & R. RANGER, ENFORCING CW LIMITS: AN INTERNATIONAL CHEMICAL WEAPONS AUTHORITY (1989).

[85] Carus, *Chemical Weapons*, *supra* note 80, at 7.

[86] With respect to Sardasht, see Statement of His Excellency Dr. Ali Akbar Velayati, *supra* note 83, at 1–2. The United Nations investigative teams first noted many civilian casualties in May 1987. *United Nations Security Council, Report of the Mission Dispatched by the Secretary-General to Investigate Allegations of the Use of Chemical Weapons in the Conflict Between the Islamic Republic of Iran and Iraq*, U.N. Doc. S/18852, May 18, 1987. Thousands of civilians were killed in an Iraqi attack on the town of Halabja (an Iraqi town then held by Iran) in mid-March, 1988. *Winds of Death: Iraq's Use of Poison Gas Against Its Kurdish Population*, *supra* note 63, at 13.

[87] R. Shuey, *supra* note 81, at 8; *see also* Carus, *NATO*, *supra* note 81.

[88] *See* THE MILITARY BALANCE 1988–89 247, 249 (International Institute of Strategic Studies, 1988).

nations, and the likelihood of successful defense is slim.[89] Moreover, cw are most effective in hot climates, because of the physical properties of the agents themselves and the physical strain on troops forced to wear protective gear in hot and humid weather.[90] If more lethal, skin-penetrating agents had been used against Iranian forces in the Iran-Iraq War, the mortality rate for Iranian soldiers would have been much higher. Such agents might be used in future wars, and even armed forces well-equipped with chemical defense (such as the U.S.) are not well-equipped for hot climates.[91]

2. Possible Use by Terrorists

Finally, the possibility exists that terrorists could use, or threaten to use, cbw in the Middle East. Predicting whether a terrorist group will use cbw is a task filled with uncertainty.[92] The potential for terrorists to use cbw has existed for some time, but the actual use of cbw for terrorist purposes has rarely occurred.[93]

Terrorists operate under some of the same technical constraints regarding cbw as do legitimate governments. The dependency of cbw on uncertain and difficult-to-predict meteorological factors, the difficulties in maintaining the potency of bw agents and the problems of predicting and controlling the spread of cbw are obstacles

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[89] Successful protection of population centers would require an extremely elaborate system, probably impossible to engineer. It would require that intelligence about an imminent chemical attack be available to give civilians time to don protective gear or time to transport themselves to collective protection units. It would not be enough to instruct people to go to the uppermost floors of office buildings (presumably above the agent cloud) because air is circulated throughout many buildings.

[90] The effect of mustard, for example, is greatly enhanced if the victim's skin is moist. VX, a nerve agent, is also more effective in hot climates because the increased vapor pressure results in higher airborne concentrations of the poison. For physical and chemical properties of chemical agents, see Department of the Army, Military Chemistry and Chemical Compounds (Oct. 1975) (Field Manual FM 3–9, AFR 355–7). For a discussion of vapor pressure, see P. ATKINS, PHYSICAL CHEMISTRY 185–91 (1982).

[91] J. Stern, The Chemical Weapons Threat to U.S. National Security: A Policy Assessment, 53–55 (1988) (Masters Thesis, available at Massachusetts Institute of Technology) [hereinafter J. Stern, The Chemical Weapons Threat] (copy on file at the Boston College Third World Law Journal office).

[92] In a congressional report on binary cw, one analyst noted, "An analysis of such a prospect [referring to terrorist use of binary cw] is necessarily speculative . . . . There are limits to our knowledge of terrorist motivation as well as behavior, which are especially apparent with respect to chemical terrorism." BINARY WEAPONS, *supra* note 36, at 31.

[93] *See* J. SIMON, TERRORISTS AND THE POTENTIAL USE OF BIOLOGICAL WEAPONS: A DISCUSSION OF POSSIBILITIES 11 (1989) (prepared for the U.S. Armed Forces Medical Intelligence Center by RAND).

in the use of cbw that plague governments and terrorists alike.[94] Other technical considerations exist that would not necessarily curb the behavior of governments, but do prevent terrorist use of cbw. For example, fashioning a practical chemical or biological weapon requires specialized resources, knowledge of chemistry or microbiology and technical expertise not likely to exist within many terrorist organizations.[95] For biological and toxin weapons, there are few reliable means of delivering the agent to the desired target. Also, the dangerousness of the substances and consequent care with which they must be handled further deter terrorists. Some of these difficulties, however, would not affect terrorists operating under the sponsorship of governments, unless the governments themselves were technologically limited in this respect.[96]

Technical considerations, however, do not function as a binding constraint. Cumulatively, they could present formidable obstacles, but no greater than those that terrorists have overcome in the past.[97] Apparently, other checks on terrorists' behavior have been operating to keep the use of cbw so low (with the exception of poisonings) as to be nonexistent for practical purposes.

As a rule, terrorists do not commit wanton murder.[98] The desire of many terrorist groups to be treated as legitimate governments may act as a restraint upon the level of violence they undertake.[99] A decision to use or threaten to use a weapon of mass destruction

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[94] These and other technological barriers to the terrorist use of nuclear, chemical and biological weapons are discussed in BINARY WEAPONS, *supra* note 36, at 38–41, 45.

[95] Simon dismisses this argument: "Dispersing various biological agents into the atmosphere can be done by 'independent' terrorist groups that have some understanding of science. For operations that require more technical knowledge, a terrorist group can always recruit the necessary people." J. SIMON, *supra* note 93, at 15.

[96] *See* J. MCDERMOTT, THE KILLING WINDS: THE MENACE OF BIOLOGICAL WARFARE 252 (1987).

[97] Jeffrey Simon describes the technological sophistication of the bomb that destroyed the Pan Am jetliner in December 1988 over Lockerbie, Scotland. J. SIMON, *supra* note 93, at 17.

[98] "Terrorists want a lot of people *watching*, not a lot of people *dead* . . . . Most terrorists adhere to the principle of the 'minimum force necessary,' that is, they try to apply just enough violence to achieve their tactical objectives . . . ." B. JENKINS, INTERNATIONAL TERRORISM: THE OTHER WORLD WAR 22–23 (Nov. 1985) (a Project AIR FORCE report prepared for the U.S. Air Force by RAND); *see also* Lacqueur, *Reflections on Terrorism*, FOREIGN AFFAIRS, Fall 1986, at 87. During the 1980's terrorist attacks became more violent (J. SIMON, *supra* note 93, at 5); the use of cbw in a terrorist attack could threaten tens of thousands of people, which is several orders of magnitude greater than the deadliest terrorist attack to date. In 1985, the bombing of an Air India flight caused 363 deaths; the bombing of the Pan Am flight over Lockerbie, Scotland caused 270 deaths. *Id.*

[99] B. JENKINS, *supra* note 98, at 23–24.

could also provoke internal dissension leading to betrayal or collapse.[100] Moreover, even a threat to kill a large number of people through conventional or unconventional means—nuclear, chemical or biological—could mobilize the resources of a government to decimate the group making the threat.[101]

On the other hand, there are also technical characteristics of cbw, particularly as compared to nuclear weapons, that would make them attractive to terrorists intent on what has been described as "macro-terrorism—the terror of mass-disruption or mass murder."[102] First, cbw would be easier to obtain than fissionable material. Second, because such a small quantity of agent or toxin is deadly, transportation and delivery of the weapon could, at least in some scenarios, be carried out by a small number of people. Third, because of the difficulty in detecting bw agents and the speed with which many chemical agents act, defending against a cbw attack after it had occurred would be difficult if not impossible.[103] Finally, compared to other weapons of mass destruction, cbw are relatively inexpensive.

Jeffrey Simon, a RAND analyst, distinguishes among terrorist groups and predicts the following characteristics of those likely to use bw, all of which also apply to cw:

> —A general undefined constituency whose possible reaction to a bw attack does not concern the terrorist group.
> —A previous pattern of large-scale, high-casualty-inflicting incidents.
> —Demonstration of a certain degree of sophistication in weaponry or tactics.
> —A willingness to take risks.[104]

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[100] "Former terrorists have indicated in interviews that each escalation in violence provokes debate and dissension within their ranks." *Id.* at 24. For a full account of a former member of a religious commune divulging to the Federal Bureau of Investigations the use of bacteria by the group to infect voters in a small city in Oregon, see J. MCDERMOTT, *supra* note 96, at 247–49.

[101] BINARY WEAPONS, *supra* note 36, at 38 (quoting Kupperman, *Nuclear Terrorism: Armchair Pastime or Genuine Thought?*, JERUSALEM J. INT'L REL., Summer 1978, at 24. Dr. Robert Kupperman, terrorism expert at the Center of Strategic and International Studies at Georgetown University, states, "To use any biological [weapon] is a vast escalation over what they have done. If terrorists start to use them, there is no end to which a nation would not go to stop them." *Quoted in* J. MCDERMOTT, *supra* note 96, at 254–55.

[102] Will, *Calculating the Public Interest*, in INTERNATIONAL TERRORISM: CHALLENGE AND RESPONSE, 208, 211–12 (B. Netanyahu ed. 1980).

[103] Exposure to some nerve agents, particularly Soman, can be treated with injections. To be effective, however, the treatment must be administered within seconds. Ex post treatment of slower acting agents, such as mustard, would be more feasible.

[104] J. SIMON, *supra* note 93, at 17.

Simon describes a few terrorist groups that display one or two of these characteristics, but none that exhibit all of them.[105] This discussion does not suggest that terrorists would never use cbw, or that the use of cbw by terrorists is inevitable, as some writers propose.[106] Rather it emphasizes the difficulty in predicting whether terrorists are likely to use cbw.

If a terrorist group used such weapons, however, several factors favor chemical over biological terrorism. First, chemical agents are easier to disseminate. Second, unlike bw, chemical agents have been deployed successfully on the battlefield; there is less uncertainty about their effects. Third, terrorists' use of bw would likely incite a far more severe reaction on the part of the public and of governments. Unlike bw, the norm of non-use of cw has eroded. The muffled and ambiguous international response to the Iraqi use of chemical agents against the Kurds, in particular, suggests that although nations may be horrified by the slaying of civilians with toxic chemicals, they are not willing to respond with stiff measures, such as sanctions. It is evident, therefore, that the possible use by terrorists of cw in particular should not be ignored in considering how to minimize cbw use.

V. Controlling the Spread of Chemical Weapons to the Third World

The international community is following two strategies to control the spread of cw to the Third World: negotiations toward an international agreement that would ban the possession of cw and, in the interim, various unilateral and multilateral approaches to limit the export of chemicals and technology.

A. *Chemical Weapons Convention Negotiations*

The United Nations Committee on Disarmament formally established the Ad Hoc Working Group on Chemical Weapons in

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[105] Simon identifies the Japanese Red Army, the European Red Army Faction and neo-nazi groups in the U.S. as not having well-defined constituencies. Groups previously engaging in large-scale violence include the Japanese Red Army as well as pro-Iranian Shiite fundamentalist groups, such as Hizbollah and Palestinian extremists, such as the Abu Nidal organization and Sikh extremists in India. The Popular Front for the Liberation of Palestine-General Command is suspected of committing the technologically sophisticated Pan Am attack. *Id.* at 17–20.

[106] *See, e.g.*, J. Douglass, Jr., & N. Livingstone, America The Vulnerable: The Threat of Chemical/Biological Warfare (1987).

1980.[107] The Working Group was later reorganized as the Ad Hoc Committee on Chemical Weapons under the Conference on Disarmament in 1984.[108] One of the principal objectives of the forty voting participants of the Conference on Disarmament has been to draft a treaty, to be adopted essentially universally, that would ban cw.[109] In 1984, the U.S. proposed a treaty text providing for on-site inspections that has served as the basis for these negotiations.[110]

The proposed multilateral ban on cw, like the Biological Weapons Convention, would ban stockpiling, production, and transnational transfer of materials and technologies for cw. It would also require the destruction of existing cw stockpiles.[111] Unlike the Biological Weapons Convention, however, the prospective treaty incorporates stringent verification measures.[112] The verification regime would include: regular on-site inspections by an international Inspectorate and continuous remote monitoring of declared facilities and destruction sites for cw; systematic inspections of civilian or governmental chemical plants that produce dual-use chemicals; and the possibility of challenge inspections of any facility suspected of producing illicit materials.[113] The proposed agreement would

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[107] T. BERNAUER, *supra* note 7, at 226.

[108] *Id.* at 5–6, 226.

[109] *Id.* at 14–18.

[110] *See* United Nations Conference on Disarmament CD/500.

[111] The provisional text of the convention reads: "1. Each State Party undertakes not to: develop, produce, otherwise acquire, stockpile or retain chemical weapons, or transfer, directly or indirectly, chemical weapons to anyone . . . . 5. Each State Party undertakes to destroy chemical weapons which are in its possession or under its [jurisdiction or] control." United Nations Conference on Disarmament CD/952, at 20.

[112] *Id.* at 33, 38–41, 76–81.

[113] Chemicals covered by the Convention are divided into three schedules, based on the risk they pose to the objectives of the Chemical Weapons Convention. Schedule I (*see* United Nations Conference on Disarmament CD/952, at 51–52) includes all known chemical warfare agents, except phosgene and hydrogen cyanide (which are important industrial reagents and of lesser interest as weapons, found in Schedule III), plus alkylphosonyldifluorides (direct precursor to Sarin and Soman), the toxins saxtoxin and ricin, and direct precursors to VX. Schedule II (*id.* at 53–54) includes important precursors to these agents, which may be important to industry, or chemicals that are "deemed to pose a significant risk to the objectives of the Convention." *Id.* at 57. Schedule III (*see id.* at 55) includes chemicals that could be used in war, or to manufacture warfare agents, or that possess physical, chemical or toxicological properties similar to those of cw. These chemicals, which are used in industry in very large quantities, are considered to pose the least risk to the objectives of the convention. For a detailed discussion of the risk classes see T. BERNAUER, *supra* note 7, at 119–22.

The "rolling text" (convention as written so far) includes: a protocol for challenge inspections (United Nations Conference on Disarmament CD/952, at 152–53 and at 193–96); a regime for Schedule I chemicals (*id.* at 107–109); a regime for Schedule II chemicals

allow production of "super-toxic lethal"[114] substances for permitted purposes[115] in quantities not to exceed one metric ton at any single declared facility.[116] It would also subject this facility to regular on-site inspections and continuous monitoring with on-site sensors and transmission systems.[117] Manufacture of chemicals important to industry, but which might also be used in war or to produce chemical warfare agents, would be closely monitored by regular on-site and material balance inspections.[118]

Negotiators at the Conference on Disarmament have agreed upon many of the provisions of the proposed Chemical Weapons Convention. The problems remaining are predominantly associated with the implementation of verification: who will do it and how it will be done. There is little argument, however, about verifying the destruction of existing stocks of cw. With these existing weapons, there will be immediate on-site inspection of chemical stockpiles and of production facilities with follow-up inspections of the destruction process, supplemented perhaps by remote monitoring.[119] Much more difficult is verification of non-production. This problem is not surprising, given the inherent difficulties in proving that something does not exist. Particularly contentious is the protocol for on-site inspections on challenge, the purpose of which is to provide States Parties the means with which to verify non-production of cw at

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(*id.* at 111–18); a regime for Schedule III chemicals (*id.* at 119–20); and a regime for monitoring of storage facilities and cw destruction (*id.* at 77–102).

[114] "Super-toxic lethal chemicals" are defined as "chemical[s] which have a median lethal dose which is less than or equivalent to .5 mg/kg (subcutaneous administration) or 2,000 mg-min/m^3 (by inhalation) when measured by an agreed method . . . ." *Id.* at 49. Super-toxic lethal chemicals are categorized as Schedule I chemicals.

[115] "Purposes not prohibited by the Convention" are defined as: "(a) industrial, agricultural, research, medical or other peaceful purposes, domestic law enforcement purposes; and military purposes not connected with the use of chemical weapons. (b) protective purposes, namely those purposes directly related to protection against chemical weapons." *Id.* at 22.

[116] Production of laboratory quantities of Schedule I chemicals outside the "single small-scale production facility" will be allowed in quantities not to exceed an aggregate quantity of 10 kilograms per year per facility. *Id.* at 107–09.

[117] *Id.* at 108–09.

[118] These are the Schedule II and Schedule III chemicals. *See id.* at 53–54, 55.

[119] *Id.* at 77–102.

The U.S. and the Soviet Union agreed to commence bilateral inspections of each other's facilities before the completion of the global ban. *See* Department of State, Memorandum of Understanding Between the Government of the United States of America and the Government of the Union of the Soviet Socialist Republics Regarding a Bilateral Verification Experiment and Data Exchange Related to the Prohibition of Chemical Weapons (copy on file at the Boston College Third World Law Journal office).

facilities not covered by regular inspections, or in cases of suspicious activities at any facility.[120]

Bipolar tension between the U.S. and the Soviet Union made negotiations between these two countries the center of attention for control of cw, although the recent break in this tension has made this context less relevant. Prior to Gorbachev's tenure as General Secretary, the Soviet Union was adamantly opposed to on-site inspections, considered by the Socialist Group to be a form of legalized spying, and by the Western Group as essential to effective verification.[121] In August 1987, shortly after making similar concessions

[120] While the conflict between Western and Socialist countries has largely been resolved, the issue of challenge inspections is still being negotiated. The U.S. proposal (United Nations Conference on Disarmament CD/500, at 2–3, art. IX & X) includes a "Fact Finding Panel" which would consist of representatives of the Soviet Union, the U.S., one Socialist, one Western, and one Neutral or Non-Aligned country. The purpose of the Panel would be to decide whether the request for a challenge inspection was legitimate. *See* T. BERNAUER, *supra* note 7, at 177. There were many objections to the U.S. position, and the Fact Finding Panel is not included in the rolling text. *Id.*

Legal scholars expressed concern that these inspections might violate the fourth amendment rights of the inspected parties, though the question is disputed. *See, e.g.*, Tanzman, *Constitutionality of Warrantless On-Site Arms Control Inspections in the United States*, 13 YALE J. INT'L L. 21 (1988).

[121] Up until the early 1980's, on-site inspection was considered by many delegations to be politically impracticable; many nations considered such schemes too intrusive, even a form of legalized spying. Attention, particularly amongst the Eastern bloc nations, focused on nonintrusive techniques, such as material balance or analysis of effluent by waste water monitoring or passive infrared detection. There evolved a general feeling among many Western delegations, however, that these remote sensing techniques would be inadequate to monitor compliance. Despite the rapid increase in the sensitivity of these technologies, they are still not yet practicable in this context.

With the advent of the Reagan Administration, on-site inspections were increasingly part of the discussion. The U.S. considered challenge inspections to be essential to the regime. Many of the early proposals looked at nonintrusive forms of verification, but obligatory on-site inspection became an important part of the discussion as early as 1974. Proposals for on-site verification of destruction of stocks, shutdown of cw plants and nonproduction were tabled by the U.S., the United Kingdom and Sweden. (United Nations Conference of the Committee on Disarmament CCD/436, tabled by the U.S. on July 16, 1974, discussed verification of destruction of stocks. Another document, United Nations Conference of the Committee on Disarmament CCD/437, tabled by the U.S. on the same day, discussed obligatory on-site verification of nonproduction. Other early proposals for on-site verification include United Nations Conference of the Committee on Disarmament CCD/PV.704, tabled by Sweden on 22 April, 1976, and the UK draft convention, United Nations Conference of the Committee on Disarmament CCD/512 of Aug. 6, 1976.)

On-site verification was met with a great deal of resistance by the Soviet Union, whose delegation claimed in 1977 that extraterritorial on-site verification is "inevitably associated with the disclosure of military, industrial and commercial secrets and consequently cannot be justified from the standpoint of assuring the security and economic interests of the States parties to a future agreement." United Nations Conference of the Committee on Disarmament CCD/538, Aug. 3, 1977 (Soviet Union).

related to the Intermediate-Range Nuclear Forces treaty, the Soviet Union agreed to an on-site inspection regime even more stringent than that outlined in the U.S. draft.[122] Paradoxically, after the Soviet Union conceded to U.S. demands, concern that challenge inspections might threaten U.S. national security suddenly rose to the fore.[123]

Substantial progress has been achieved, however, in bilateral negotiations between the U.S. and the Soviet Union. In June 1990, President Bush and President Gorbachev signed an executive agreement outlining a plan for mutual reductions of chemical stockpiles down to approximately 5000 agent-tons by the year 2002.[124] President Bush agreed to cease production of binary munitions immediately;[125] the Soviet Union announced in 1987 that it had stopped producing CW.[126] While the degree of verifiability required to monitor compliance with the proposed Chemical Weapons Convention is unclear, this issue is probably more relevant in the U.S.-Soviet context than to the Treaty's ability to halt horizontal proliferation. Analysts believe that the chemical industries of the developing coun-

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[122] *See* Statement by E.A. Shevardnadze, at the Conference on Disarmament (Aug. 6, 1987) (unofficial translation) [hereinafter Shevardnadze].

[123] According to the provisions of the U.S. draft, any governmental facility, including secret National Security Administration, CIA and nuclear weapons design and manufacturing facilities, might be vulnerable to challenge inspections on an anytime anywhere basis, within 24 to 48 hours of the request for the inspection on the part of any State party to the treaty. United Nations Conference on Disarmament CD/500 1984, at 10, 11. The U.S. draft (article X) proposed inspections of governmental facilities without the right of refusal, but private facilities would have the option to refuse inspections. *Id.* at art. XI. This differentiation between private and government facilities, intended to protect the fourth amendment rights of the inspected parties, was considered discriminatory against the Socialist States, whose industries are all government-owned. *See* Smidovich, *Principles and Procedures for Verification*, in IMPLEMENTING A GLOBAL CHEMICAL WEAPONS CONVENTION 2 (E. Arnett ed. 1987). The members of the Conference on Disarmament, however, have not yet resolved the protocol for challenge inspections.

[124] *Union of Soviet Socialist Republics—United States: Agreement on Destruction and Non-Production of Chemical Weapons and on Measures to Facilitate the Multilateral Convention on Banning Chemical Weapons* 29 I.L.M. 932, 935 (1990). Article III states: "Upon entry into force of the Agreement and thereafter, each party shall not produce chemical weapons." *Id.* at 934. Article IV states: "Each Party shall reduce and limit its chemical weapons so that, by no later than December 31, 2002, and thereafter, its aggregate quantity of chemical weapons does not exceed 5000 agent-tons." *Id.*

[125] This is implicit in the wording of Article III. *Id.* at 934.

[126] General Secretary Gorbachev proclaimed in Prague on April 10, 1987, "I can tell you that the Soviet Union has stopped making chemical weapons. As you know, the other Warsaw Treaty countries have never produced such weapons and never had them on their territory." United Nations Conference on Disarmament CD/751, at 5.

tries will be far easier to monitor than those of the developed world.[127]

B. *The Chemical Weapons Convention's Impact in the Middle East*

U.S. efforts to ban cw were initially driven by the desire to reduce the Soviet chemical threat, not only because that nation was the U.S.'s principal adversary, but also because the Soviet Union maintained the largest chemical stockpile in the world.[128] Three factors, however, may now diminish the threat of chemical warfare in the European theater. First, the bilateral agreement will substantially reduce the Soviet stockpile to 5000 agent-tons by the year 2002.[129] Second, the Soviet Union appears willing to adopt the multilateral cw treaty, which would ultimately entail complete destruction of all stocks of cw.[130] Third, changes in the Warsaw Pact reduce the threat of chemical warfare in Europe.

At the same time, several variables suggest that the prospect of chemical warfare in the Middle East is becoming far more menacing. These variables include: the proliferation of ballistic missiles, as well as cw, throughout the region;[131] continuing inter-Arab, Arab-Iranian, and Arab-Israeli tensions; the paucity of protective gear;

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> [T]he developing countries have a limited and/or primitive industrial and technological base, which makes it easy to monitor and spot any attempt to violate the provisions of the Convention. In most cases, if these countries became involved in chemical weapons production, they would rely for many of their basic needs on the developed countries. This makes verification of compliance by the developing countries much easier. On the other hand, the technological and industrial capacities which make chemical weapons production possible are widely diffused within the industrial and economic structure of the developed countries, and their use in secret production of chemical weapons would be difficult to trace, unless intrusive measures are devised.

Ezz, *The Chemical Weapons Convention: Particular Concerns for Developing Countries*, 2 UNIDIR NEWSLETTER, March 1989, at 1.

While it is difficult to dispute the veracity of General Ezz's claim that "most" developing countries would be forced to rely on developed countries for help in cw manufacture, there is no guarantee that private companies will abide by the terms of the Convention (i.e., not sell cw precursors). The numerous examples in the press of private companies abrogating or finding loopholes in export control laws do not bode well. *See, e.g.*, Thatcher and Aeppel, *supra* note 60.

It is the few developing countries pursuing indigenous, secret manufacture of cw that pose the greatest risk to the objectives of the Convention. *See supra* note 80.

[128] *See supra* note 3.

[129] *See supra* note 124.

[130] *See* Shevardnadze, *supra* note 122, at 9–10.

[131] *See* R. Shuey, *supra* note 87, at 1–3.

and the difficulty of protecting troops in hot climates.[132] In marked contrast to the U.S. and the Soviet Union, the Middle East nations have been expanding their stockpiles.[133] For all these reasons, the proposed Chemical Weapons Convention would almost certainly have its biggest impact in the developing world, particularly in the Middle East—not in the U.S.-Soviet context.

On the other hand, the combination of international monitoring and export controls will make production of cw hard to conceal and more expensive for nations whose chemical industries are not highly developed. This expense, combined with the threat of disclosure and the likelihood that adversaries would take steps to defend themselves against chemical attack, would add to the costs of pursuing chemical warfare, particularly in the case of lesser-developed countries. Moreover, if developing countries that are considering the acquisition of cw are convinced that their potential adversaries no longer stockpile cw, the incentive to acquire them may be lessened, even if the nation in question is not a Party to the Chemical Weapons Convention. This incentive is doubly reduced for signatories to the Convention.

At least two factors threaten the effectiveness of the Chemical Weapons Convention in the Middle East. First, it is not at all certain that these countries will adopt the treaty. At the conference on the Geneva Protocol in Paris in January 1989,[134] Iraqi Foreign Minister Tarik Aziz claimed, "Iraq believes that any call for a comprehensive ban on chemical weapons must be coupled with a parallel and similar call for a comprehensive ban on nuclear weapons."[135] The twenty-two member Arab league initially expressed support for this view, although by the Conference's end all 149 participants signed the final Declaration opposing chemical warfare, settling for a paragraph that urged "general and complete disarmament" without mentioning nuclear weapons specifically or formally linking chemical and nuclear disarmament.[136] Although the early statements by Iraq and the Arab league might be seen as political posturing with

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[132] *See* J. Stern, The Chemical Weapons Threat, *supra* note 91, at 51–55.

[133] *See supra* note 80.

[134] The "Conference of States Parties to the 1925 Geneva Protocol and Other Interested States on the Prohibition of Chemical Weapons" was held in Paris from January 7–11, 1989. One hundred forty-nine States participated. *See* T. BERNAUER, *supra* note 7, at 55–56.

[135] Tuohy, *Link a Poison-Gas Ban to Atomic Weapons, Arabs Say*, L.A. Times, Jan. 9, 1989, at 10.

[136] *Text of the Declaration From the Paris Conference on Chemical Weapons*, N.Y. Times, Jan. 12, 1989, at A10, col. 1.

respect to Israel, their support for chemical disarmament seems unlikely.[137] Second, nations that have acquired these weapons, found to be useful in the Iran-Iraq War,[138] may be less receptive to a cw ban. This problem will grow as their cw-manufacturing capability becomes more sophisticated and as increasing numbers of their potential adversaries acquire cw.

C. *Export Controls*

In part from impatience with the sluggish pace of the Chemical Weapons Convention negotiations, particularly in light of the disturbing discovery that Western companies were responsible for most of Iraq's cw build-up,[139] twenty Western nations, known as the Australia Group, have been cooperating in an effort to control proliferation.[140] These nations have been tracking cw precursors trade and controlling the sale of suspect chemicals and technologies to nations known to be seeking cw.[141]

A number of problems with this informal export control regime imposed by the members of the Australia Group have emerged. For instance, it is possible to circumvent the regulations by arranging sales through third parties, as Iraq did in acquiring phosphorous oxychloride (a precursor to the nerve agent Tabun) in 1984.[142]

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[137] The Minister of Foreign Affairs of Iran, Dr. Ali Akbar Velayati announced at the Conference on Disarmament: "To be frank, if the convention were ready today, the chances of its success in our region would be somewhere near zero . . . ." United Nations Conference on Disarmament CD/PV.543 (*cited in* CHEMICAL WEAPONS CONVENTION BULLETIN, June 1990, at 12).

[138] Useful, if not in a strictly military sense, at the very least in a political sense and a psychological sense. *See* Ekeus, *The Option of Using Chemical Weapons*, CHEMICAL WEAPONS CONVENTION BULLETIN, June 1990, at 1–13.

[139] *See supra* note 127.

[140] This group was formed at the suggestion of the Australian Ministry of Foreign Affairs. Its members are diplomats and members of the intelligence communities from 20 Western nations and the European Community, including Australia, Austria, Belgium, Canada, Denmark, West Germany, France, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Britain and the U.S. Thatcher, *Their Secret Task is to Halt Spread of Chemical Weapons*, Christian Science Monitor, Dec. 13, 1988, at B14; telephone interview with Trevor Wilson, Counsellor & Head of Political Branch of the Australian Embassy, Washington, D.C. (Dec. 3, 1990).

The members of the Group meet twice a year to share intelligence on who is attempting to buy what from whom. They also discuss which precursors to cw might be banned for export. Thatcher, *supra*.

[141] Thatcher, *supra* note 140, at B14.

[142] Phosphorus oxychloride is (and was) controlled for export from members of the European Economic Community. A Dutch company, Melchemie, accepted an order for 60 tons of this chemical, but when pressure not to accept the order became too great, "company

Because the regime is strictly voluntary, and only twenty nations participate in the decision as to which precursors to monitor, it is fairly easy for a determined purchaser and a determined chemical trader to find a way around the regulations.[143] The recent sale of thionyl chloride to Iran, used to produce both mustard and the nerve agent Sarin, is but one example. A German company arranged the sale; the chemical was produced in India, which did not control export of this material.[144] In addition, many dual-purpose chemicals regulated by the Australia Group nations are produced in countries that do not regulate their trade.[145]

There is no law prohibiting newly industrialized nations from producing precisely those chemicals and materials that the Australia Group hopes to keep out of the hands of nations in search of cw. Indeed, those who choose to produce and export these chemicals would control a greater share of the market. The scarcity of these chemicals, resulting from the reduction in the number of suppliers, would lead to higher profits for companies that do not abide by the Australia Group Controls. Furthermore, producer states would have control over which nations would have access to the chemicals.

Extralegal efforts of the kind undertaken by the Australia Group are unlikely to be as effective at stopping proliferation as a cw ban, which would have a legal mandate and would capture more of the producer nations than even an augmented Australia Group. The U.S., however, has a number of unilateral and multilateral options to redress the weaknesses in the current export control regime. These alternatives can be classified into three categories: first, efforts to dissuade both domestic and foreign chemical manufacturers from selling cw precursors to the Middle East nations, including fines and loss of export/import rights; second, the imple-

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officials suggested to the Iraqis that they buy the same materials from Ausidet, a division of the Italian chemical conglomerate Montedison. The Italians agreed to the sale, and purchased the chemicals for Iraq from the French company ATOCHEM." Middle East Defense News, Oct. 24, 1988, at 4.

[143] International law provides no mechanism for enforcing the Australia Group; it is a voluntary organization. Each country may decide how many and which chemicals to control. *See* Thatcher, *supra* note 140, at B14-B15; *see also* SIPRI CHEMICAL & BIOLOGICAL WARFARE STUDIES, NO. 4: THE CHEMICAL INDUSTRY AND THE PROJECTED CHEMICAL WEAPONS CONVENTION 96 (J. Robinson ed. 1986) (partial list of which countries control which chemicals).

[144] Hazarika, *India Says It Sold Iran a Chemical Used in Poison Gas*, N.Y. Times, July 1, 1989, at 1, col. 4.

[145] For example, potassium fluoride (a precursor of the nerve agent Tabun) is now regulated in many countries, but it is produced in Argentina and Brazil; dimethylamine (also a precursor of Tabun) is produced in India and Romania; phosphorous trichloride (a precursor of nerve agents) is produced in Brazil, China, India and the Soviet Union.

mentation of a regime for sanctions targeting countries that purchase contraband materials; and, third, mandatory sanctions against use.

Last year, the U.S. House of Representatives and the Senate passed competing versions of sanctions legislation.[146] Both bills would amend U.S. trade law to require export controls on precursors to cw.[147] Both also would require sanctions against companies or persons who knowingly contribute to the efforts of any nation to produce or use cbw.[148] In addition, they would require sanctions against countries that use cbw in war or against their own citizens or that are making substantial preparations to do so.[149] The Senate bill (S.195) includes more stringent sanctions.[150] The House bill

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[146] The Senate bill, S.195, passed unanimously in May 1990. The House bill, H.R. 3033, passed in November 1989. At the time of this writing, a conference bill has passed and awaits President Bush's decision to sign or to veto. Wines, *Bush Weighs a Veto of Sanctions for the Spread of Chemical Arms*, N.Y. Times, Nov. 1, 1990, at A12, col. 3.

[147] The House and Senate bills contain almost identical language on this point. "Section 6 of the Export Administration Act of 1979 (50 U.S.C. App. 2405 [(1982)]) is amended by adding at the end the following

> (q) Chemical and Biological Weapons—a validated license shall be required under this section for the export of any goods or technology that the President determines would assist the recipient country in acquiring the capability to develop, produce, stockpile, deliver, or use chemical or biological weapons, unless the destination of such export is a country with whose government the United States has entered into bilateral or multilateral arrangements for the control of chemical or biological weapons related goods or technology."

H.R. 3033, 101st Cong., 2d Sess., § 102(b) (1989); *see also* S. 195, 101st Cong., 1st Sess., § 202(b) (1989).

[148] The Senate bill states that the President "shall impose on a foreign person the sanctions under subsection (b) if the President determines that the foreign person . . . has knowingly and substantially contributed to the efforts to use, develop, produce, stockpile, otherwise acquire chemical or biological weapons by any country that . . . " used cbw, or made substantial preparations to do so, or has been designated as a nation that supports terrorism. S. 195, § 203(a). The language of the House bill is almost identical. *See* H.R. 1033, § 103(a).

The actual sanctions proposed by both bills include that the U.S. government shall not procure goods or services from the foreign person and that import rights into the U.S. shall be revoked. S. 195, § 203(b); H.R. 3033, § 103(c).

[149] "It is the purpose of this Act—(1) to mandate United States sanctions and to encourage international sanctions against countries that use chemical or biological weapons in violation of international law or use lethal chemical or biological weapons against their own nationals." S. 195, § 3. "If, at any time, the President determines that a country has engaged in activities described in section 201(1), the President shall forthwith impose the sanctions set forth . . . ." H.R. 3033, § 201(a). Section 201(1) covers the use of "chemical or biological weapons in violation of international law." *Id.* at § 201(1).

[150] The essential differences are that in the House version, the President must impose at least three sanctions out of a list of eight and must impose an additional sanction if in three months the country in question has not ceased using cw. The House list includes as an

(H.R.3033) is preferred by the Bush Administration because it allows the President substantially more flexibility in the imposition of sanctions against countries.[151]

The U.S. chemical industry objects to the imposition of any additional restrictions on U.S. companies, claiming that U.S. export controls are the most stringent in the world and that their ability to compete is consequently already impaired.[152] Instead, they support multilateral efforts.[153] Another argument against applying unilateral sanctions to companies is that they might be misconstrued as trade restrictions. Senator Helms anticipated this argument, and quoted from the GATT as follows: "[N]othing in this Agreement shall be construed . . . to prevent any contracting party from taking any action which it considers necessary for the protection of its essential security interests . . . ."[154]

At Senate hearings, Elisa Harris, Senior Analyst at the Brookings Institute, claimed that sanctions against companies would have

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option the suspension or downgrade of diplomatic relations, a sanction not included on the Senate list. H.R. 3033, §§ 202(a) and (c).

The Senate bill contains a list of 10 mandatory sanctions, seven of which are similar to those in the House bill, but also including termination of landing rights, prohibition of U.S. banks from making loans to the country in question, and denial of export licenses. S. 195, §§ 101, 102. The Senate bill allows the President to waive the sanctions if doing so is in "the national interest." S. 195, § 102.

[151] "It [S. 195] is opposed by the Administration, which prefers the House bill, H.R. 3033, in that it allows the President more discretion in applying the sanctions." CHEMICAL WEAPONS CONVENTION BULLETIN, Nov. 1989, at 12. "Testimony [on June 22, 1989, before the Subcommittee on International Finance and Monetary Policy of the Committee on Banking, Housing and Urban Affairs] from Under Secretary of State Reginald Bartholomew reiterates the administration's opposition to automatic sanctions, whether against countries that use cw or companies that aid proliferation, but reaffirms the administration's readiness to work with Congress on developing some form of sanctions legislation." *Id.* at 5. Secretary of State James Baker said that the Senate version "does not give the President sufficient flexibility to impose or waive sanctions based on a consideration of the nation's security interests." Wines, *supra* note 146, at A12.

[152] "The existing U.S. export control system constitutes the single most restrictive such program in the world. Additional regulatory controls (particularly those imposed unilaterally) that unduly restrict legitimate business, and impose a competitive disadvantage, are neither warranted nor necessary." Written Statement of M. Turnipseed, on behalf of the Chemical Manufacturers' Association, before the Subcommittee on International Finance and Monetary Policy, June 22, 1989 at 1–2 [hereinafter M. Turnipseed]. The Chemical Manufacturers' Association favors multilateral cooperation as opposed to "unilateral control, or threats of sanctions." *Id.* at 3. *See also* Written Statement of Dr. Will Carpenter, on behalf of the Chemical Manufacturers' Association, before the Senate Committee on Foreign Relations, May 9, 1989, at 2–3 (available from Chemical Manufacturers' Association).

[153] *See id.*

[154] S. 138, 101st Cong., 1st Sess., 135 CONG. REC. S679, S680 (daily ed. Jan. 25, 1989) (quoting General Agreement on Tariffs and Trade, Oct. 30, 1947, 188 U.N.T.S. 266).

significant political value.[155] Even unilaterally imposed sanctions, she claims, would send the message to supplier countries and to domestic and foreign manufacturers that the U.S. is serious about stopping the flow of precursors to CW into the developing world.[156] The degree to which the political and financial cost of illicit chemical trade would be raised by sanctions of this kind depends upon the number of nations that are willing to comply with a regime of sanctions.

There are several potential problems with sanctions. Their use might make it more difficult to use diplomacy to end conflicts. There may be overriding foreign policy interests. In addition, sanctions have rarely achieved their intended objectives in the past. Increasing international interdependence has resulted in the greater likelihood of finding alternative sources for the commodities in question, especially, but not exclusively, if the sanctions were unilaterally imposed.

According to a recent study published by the International Institute of Economics, of the nine cases where sanctions were imposed against countries in connection with nuclear safeguards or nuclear reprocessing to dissuade the target country from pursuing an indigenous nuclear capability, only two were effective.[157] In both of these cases, *United States and Canada v. South Korea* and *United States v. Taiwan*, the U.S. had significant leverage. The authors of the study conclude that in most cases, sanctions do not contribute very much to the achievement of foreign policy goals. Exceptions are more likely if the policy goals are modest, the target country is weak or the target country is an ally rather than an adversary.

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[155] E. Harris, Testimony before the Subcommittee on International Finance and Monetary Policy, June 22, 1989, at 9.

[156] Harris claimed that sanctions against companies would send

> a clear message that the United States is not only concerned about the spread and use of chemical weapons, but is determined to take whatever steps are necessary to halt these developments. The real significance of this legislation, however, lies in its potential impact on international behavior. Sanctions against suppliers will force companies to look very carefully at orders for the items they provide.

E. Harris, Testimony before the Subcommittee on International Finance and Monetary Policy, June 22, 1989, at 9.

[157] These nine case are: Canada v. India (1974–76); Canada v. Pakistan (1974–76); United States v. South Korea (1975–76); United States v. South Africa (1975–82); United States v. Taiwan (1976–77); United States v. Brazil (1978–81); United States v. Argentina (1978–82); United States v. India (1978–82); United States v. Pakistan (1979–80) (*discussed in* G. HUFBAUER, J. SCHOTT & K. ELLIOTT, ECONOMIC SANCTIONS RECONSIDERED: HISTORY AND POLICY, 496, 501, 505, 523, 540, 587, 592, 598, 636 (1985)).

Sanctions that impose hardship on the sender country are less likely to succeed. Moreover, the greater the number of countries required to cooperate in implementing the sanctions, the greater the probability of failure. "Contrary to conventional wisdom, multilateral sanctions are not frequently associated with success."[158] The authors, however, found that multilateral sanctions were more effective when designed in cooperation with allies.[159]

Within a treaty regime, export controls would be much more effective than the twenty-member Australia Group, because a larger number of nations would participate.[160] With respect to sanctions aimed at stopping the flow of precursors, a global regime would greatly diminish the existence of alternative sources, as, at least in theory, the Convention would encompass all chemical-producing nations.[161] Sanctions would be less likely to impose hardship on a given chemical exporter[162] because the entire chemical industry would be subject to the same controls.

The treaty could also provide the legal and political foundation for sanctions against use.[163] Sanctions imposed by parties to the Convention could be more effective than the unilateral sanctions in

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[158] G. HUFBAUER, *supra* note 157, at 89. The authors' examples of multilateral sanctions regimes that have failed to achieve policy goals include the Arab embargo of Israel (*id.* at 180–86) and the U.S. and Coordinating Committee for Multilateral Export Controls (COCOM) strategic controls against the Soviet Union and the Soviet bloc (*id.* at 211–20).

[159] It is possible that reduction in U.S.-Soviet tensions will have a profound influence on the efficacy of multilateral sanctions regimes, because each side will no longer assume *a priori* that its aim must be to circumvent the efforts of the other. The large number of countries that were willing to comply with the United Nations embargo against Iraq, imposed in August 1990, greatly enhanced its effectiveness. *See, e.g.*, Burns, *Confrontation in the Gulf: Iraqis Threaten to Attack Saudis and Israelis if Nation is Strangled*, N.Y. Times, Sept. 24, 1990, at 1, col. 6.

[160] The number of signatories required for entry into force of the Convention is likely to be sixty. Other provisions for entry into force include the U.S. position that all countries with cw capabilities must sign. *See* T. BERNAUER, *supra* note 7, at 201.

[161] *See id.* The problems with the informal export control regime imposed by the members of the Australia Group include: that it is possible to circumvent the regulations by arranging sales through third parties, that the regime is strictly voluntary and only twenty nations participate, and that many dual-purpose chemicals regulated by the Australia Group nations are produced in countries that do not regulate their trade. Because the Chemical Weapons Convention would affect the entire industry, the universal adoption of the ban could solve these problems.

[162] M. Turnipseed, *supra* note 152, at 2–3.

[163] Whether sanctions will be included in the Chemical Weapons Convention is still undetermined. A number of delegations favor the inclusion of sanctions in the treaty regime. United Nations Conference on Disarmament CD/952, at 225.

the proposed legislation discussed above.[164] Not only would these sanctions be multilateral, but they would also be mandatory.[165]

Moreover, the treaty would make multilateral export controls legally binding. Even an expanded Australia Group, as proposed in the Conclusion, would most likely not include as many potential suppliers of cw precursors as would the Chemical Weapons Convention. In contrast to the relatively small number of manufacturers of nuclear weapons materials, there are many manufacturers of a large number of the relevant chemicals—not just among Western nations, but throughout the industrialized and semi-industrialized world.

VI. Improving the Biological Weapons Convention

Efforts to control the proliferation of bw have been minimal compared to those directed against the proliferation of cw, because the perceived threat is much less. Nevertheless, the Iraqi invasion of Kuwait again aroused suspicions that Iraq has not only a cw capability, but a bw capability as well.[166] The Third Review Conference of the Biological Weapons Convention, to be held in 1991, provides a timely opportunity to address some of the weaknesses of the Convention that could lead to increased proliferation of bw.

In 1989, the Federation of American Scientists (FAS) established a Working Group on Biological Weapons Verification to develop recommendations to the Third Review Conference. The FAS group recommends that the Review Conference undertake actions to expand the authority of the United Nations Secretary-General. It would allow him to conduct inquiries into compliance concerns that do not involve use of bw but involve other violations of the Biological Weapons Convention, such as production. FAS also recommends that the Review Conference establish that parties to the

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[164] Because the House bill (H.R. 3033) allows the President more discretion in imposing sanctions, there is greater potential that broader foreign policy or trade objectives might interfere with strong sanctions.

[165] Within a treaty regime, foreign policy or economic considerations would be far less likely to impinge on the decision whether to impose sanctions. These objectives clearly had an impact on the U.S. decision not to impose sanctions against Iraq on several occasions, including June 1990. "It would be the American farmer and the American exporter who would, in effect, be punished . . . . The Iraqis would be able to purchase the same kinds of goods and products elsewhere on the world market," said John Kelly, the Assistant Secretary of State for Near Eastern and South Asian Affairs. Krauss, *Bush Aide Opposes Sanctions on Iraq*, N.Y. Times, June 16, 1990, at 3, col. 1.

[166] Carus, *Missiles in the Middle East: A New Threat to Stability*, Policy Focus, June 1989, at 5.

Biological Weapons Convention have the right to request that the Secretary-General make such an inquiry. Other recommendations of the group include: 1) that parties to the treaty ensure that biological laboratories in their countries abide by safety standards established by the World Health Organization; 2) that the Review Conference augment the number of annual declarations parties make to build confidence in compliance to encompass permitted activities directly related to the Convention;[167] and 3) that the Review Conference establish an ongoing committee to oversee the functioning of the treaty.

In addition to strengthening confidence-building measures, the FAS Group proposes that the Third Review Conference undertake actions that will lead to a verification protocol to the Convention.[168] Specific recommendations for a verification protocol include: requirements to adhere to certain laboratory safety standards for infectious agents; annual declarations of many facilities and activities that are permitted under the treaty but may raise compliance concerns and procedures for the inspection of such "declared facilities;" and provisions for challenge inspections.[169] In conjunction with proposed actions to be taken at the Third Review Conference, one group of analysts recommends that the international community establish an International Biological Monitoring Agency modeled after the International Atomic Energy Agency[170] to "increase the contribution of biology to peace, health and prosperity in the world" while making sure that the biological sciences would not be used "to serve offensive military purposes."[171]

VII. Conclusions

Since World War I, confirmed instances of the use of cw and allegations of the use of bw have occurred exclusively in the Third World. Many Third World countries appear to be interested in adding these weapons to their arsenals. The ambiguous interna-

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[167] *See supra* note 58.

[168] Article V, Proposal A reads: "The Review Conference should call a series of meetings to draw up a draft proposal for a Protocol to the BWC on verification." *Proposals for the Third Review Conference of the Biological and Toxin Weapons Convention*, The Federation of American Scientists Expert Group on Biological Weapons Verification, Final Report, Sept. 1990. (copy on file at the Boston College Third World Law Journal office).

[169] *Id.*

[170] E. Geissler, *supra* note 4, at 153.

[171] *Id.* at 198 (Marcovich, "Annexe 6. Proposal for an International Biological Monitoring Agency").

tional response to Iraq's use of cw in the Iran-Iraq War damaged the norm of non-use of cw and perhaps made the future use of these weapons, either by states or by state-sponsored terrorists, more likely. The Middle East may be particularly vulnerable to further use of cw.

After nearly two decades, the negotiations leading toward a comprehensive ban on the possession of cw are showing real promise, yet the task of convincing Third World countries, particularly those in the Middle East, to become parties to the treaty may prove daunting. Meanwhile, the U.S. and many other countries are exploring unilateral and multilateral measures to address this threat, including export controls and sanctions.

The best hope for stopping the flow of precursors to cw into the Middle East, and ultimately the production of cw, is a global ban on cw manufacture, export and use. In the interim, an expanded and strengthened multilateral export control regime, based on the Australia Group, would serve a number of important objectives. This export control regime should:[172]

> —strive to include all nations with chemical manufacturing capabilities;
> —make use of the list of cw precursors developed by the Australia Group;[173]
> —include mandatory sanctions against chemical companies that engage in trade of contraband chemicals; companies would thus be doubly deterred from such activities—not only by the laws imposed by their own government, but also by the threat of multilaterally imposed strictures on their pursuit of international trade in other legal commodities;
> —require importing nations to supply proof that dual-purpose chemicals are to be used for permitted purposes;
> —gather and share existing economic intelligence about chemical manufacturing capabilities all over the world. For example, the regime should make available information concerning nations that possess phosphate rock, indicating which are capable of extracting elemental phosphorus on a large scale and which are on the verge of achieving such a capability;[174]

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[172] A more comprehensive discussion of this proposal, and of the efficacy of export controls is contained in J. Stern, The Chemical Weapons Threat to International Security in the Middle East: United States Policy Alternatives (1989) (Center for Science and International Affairs, Harvard University).

[173] For a list of precursors that the Australia Group controls, see Thatcher, *supra* note 140, at B15.

[174] Elemental phosphorus, or alternatively phosphorus trichloride, is essential for the manufacture of several nerve agents. Phosphorus trichloride is on the Australia Group list. The effectiveness of controls on the export of phosphorus trichloride is highly dependent

—share intelligence about the particular chemicals that a given cw-producing nation would be seeking.

Such a regime, while far from perfect, would reduce the potential payoff to companies contemplating export of chemicals for illicit purposes. While it is unlikely that all countries capable of manufacturing cw precursors would participate, the number of suppliers would nonetheless decrease, resulting in increased costs for importers. It will take all of these measures, and perhaps more, to ensure that these weapons will not play a role in international conflicts of the future.

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on whether the target nation has indigenous manufacturing capability of elemental phosphorus, because the element is extremely difficult to transport. For a discussion of the manufacture of elemental phosphorus, see CRC HANDBOOK OF CHEMISTRY AND PHYSICS B29–30 (62d ed. 1981).